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HOSPITAL BUILDING NOTE

13

CENTRAL STERILE SUPPLY DEPARTMENT

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Central Sterile Supply Department

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An addendum to Appendix E of Hospital Building Note No. 2, *The Cost of Hospital Buildings*, which sets out cost recommendations for the Central Sterile Supply Department is supplied with this Building Note.

I. Scope

This Building Note gives guidance on the design of a central sterile supply department at a district general hospital or teaching hospital. A department at a district general hospital may also serve other hospitals in the vicinity.

The department in this note will serve 800 beds or upwards with related diagnostic and treatment facilities for out-patients and casualties.

II. General considerations

Studies of central sterile supply

The use of central sterile supply departments in this country is in an early stage of development. A Joint Committee of the Central and Scottish Health Services Councils has been set up to consider and advise on

(*a*) the policy which should be followed on the provision of central sterile supply services in National Health Service hospitals; and

(*b*) the organisation and control of central sterile supply departments.

This subject is being studied by the Nuffield Provincial Hospitals Trust, and certain aspects are also being investigated by King Edward's Hospital Fund for London. The Sterilisation Group of the Ministry of Health Medical Supplies Working Party are considering certain matters in connection with sterilisation in hospitals, including equipment.

Purpose of a central sterilising service

The object of a central sterilising service is to concentrate the responsibility for and the work of sterilisation in one properly equipped and staffed unit. This should reduce work for the nursing staff, allowing them more time to devote to patients. It should minimise the need for sterilising elsewhere in the hospital.

Scope of department

In one region central sterile supply departments are being planned to serve a considerable part of a region with some sterile products, leaving the more bulky materials (e.g. theatre gowns) to be sterilised on a hospital group basis, but the consensus of opinion at present appears to favour departments serving a group of hospitals.

Disposable articles and commercially sterilised articles

The commercial supply of some sterilised articles, either as disposable items or on a return and re-sterilisation basis should be considered. It seems unlikely that the return and re-sterilisation method will make a large contribution to the problem, but the supply of pre-sterilised disposable articles has many advantages for the hospital. However, the actual disposal of "disposable" articles involves its own problems, although this has no direct bearing on the planning of the C.S.S.D.

Theatre instruments

Because a large number of instruments is required for the operating theatre it is normal practice to sterilise these in the operating theatre suite. There are advantages in centralising instrument processing within each operating suite—in this way one unit can serve a number of operating rooms. Gowns, dressings, etc., however, should be sterilised in the central department.

Methods of sterilisation

There are several methods of sterilisation in use. Those normally used in a hospital central sterile supply department are moist heat and dry heat. Gamma-irradiation is also being used commercially to sterilise some disposable articles, but at present the cost of the apparatus is too great to be considered except perhaps for a region or part of a region. It is in any event unlikely that gamma-irradiation will supersede autoclaves, i.e. high-pressure pre-vacuum sterilisers, as the process is time consuming and unsuitable for repeatedly sterilising some articles, e.g. fabrics.

There are two main types of autoclaves using the moist heat method—

(i) the downward displacement autoclave (suitable for bowls, most instruments and fluids)

(ii) the high pressure high vacuum autoclave (suitable for porous loads, i.e. dressings, gowns, and packs containing gloves, bowls and instruments).

Dry heat provided either by hot air ovens or infra-red sterilisers is used mainly for syringes, but some hospitals sterilise certain other instruments in this way.

Disinfection

Contaminated articles not already disinfected elsewhere require disinfection before cleaning and sterilising. In this case an autoclave may be needed in the clean-up room (III)(A)(*b*).

Packs

Three methods are being investigated for the supply of sterile articles to the various departments—

(i) individual packs for each article,

(ii) comprehensive packs of instruments, dressings, etc., required for any particular procedure,

(iii) small packs containing basic sets of articles, e.g. gowns and masks, gallipots and swabs or a number of selected instruments, to which individual packs can be added when necessary.

Method (i) is especially suitable for articles such as syringes which are sterilised in dry heat. Method (iii) has an advantage over method (ii) as it gives greater flexibility in use and reduces the amount of unused material which has to be re-sterilised.

There are various types of wrappings or containers suitable for articles to be sterilised and to serve as protective covering after sterilisation. Aluminium containers are generally used for syringes and also for other

small instruments which are sterilised in dry heat. Paper and cardboard boxes are favoured as coverings for instruments and packs to be sterilised though nylon bags, cloth and perforated metal drums are still in use and other materials may also be available. All these must allow rapid removal of air and free entry of steam but they must not allow entry of bacteria when air is admitted at the end of the process.

Fluids

Water for intravenous injections and pharmaceutical solutions is generally sterilised in the pharmacy under the supervision of the pharmacist. The most reliable method of sterilising fluids for topical use is by sterilising in flasks and bottles in an autoclave. This process will normally take place in the C.S.S.D. and will be quicker when spray cooling of the flasks is introduced. (An alternative is the use of filter presses where fluids are needed in large quantities.)

Location of department

To save unnecessary handling of supplies and articles returned for processing and to facilitate deliveries to other hospitals the central sterile supply department should be in the service zone. It should be connected by adequate circulation routes to all the departments it serves. There are advantages in planning the department near the main boiler-house—see Section V (*Steam Services*).

Layout

The department should be planned on the basis of a production flow. Figure 1 shows the flow of articles in the department. The internal sub-division of this department should be flexible to enable space to be re-distributed between sections as and when this is found necessary.

Contaminated articles and sterile packs must be kept separate and it is necessary to have different entrances and exits for clean goods, dirty goods, and sterile goods. An external delivery point with a covered loading bay may be required.

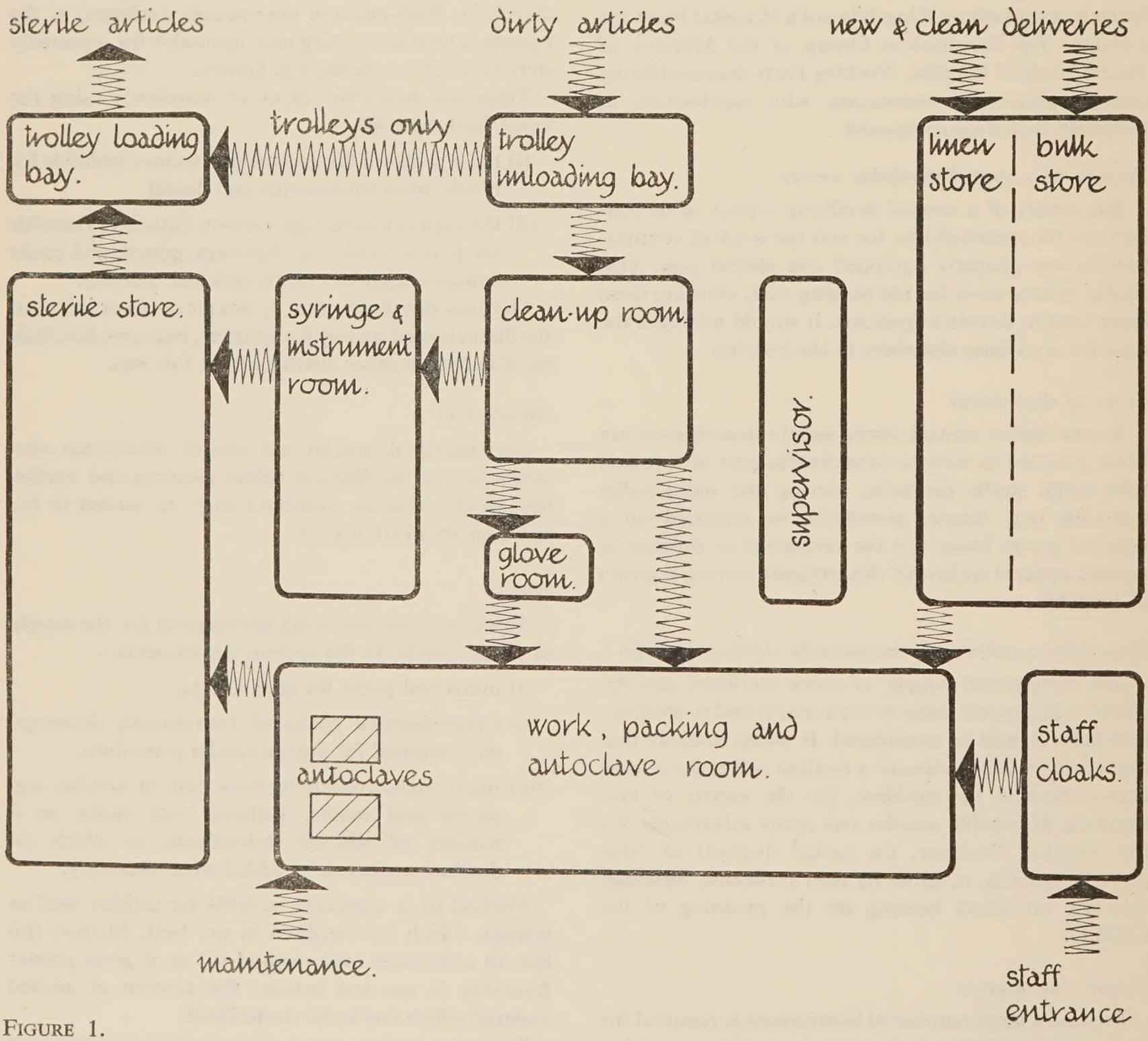

FIGURE 1.

III. List of rooms

The accommodation for central sterile supply departments has been divided into two groups.

A. Basic accommodation

This should be provided in all cases and should consist of the following—

(*a*) Trolley unloading bay
(*b*) Clean-up, washing and drying room
(*c*) Glove room
(*d*) Syringe and instrument room
(*e*) Bulk store
(*f*) Linen store
(*g*) Supervisor's office
(*h*) Work, packing and autoclave room
(*i*) Sterile store
(*j*) Trolley loading bay
(*k*) Staff lockers and lavatories
(*l*) Circulation space necessary for the above accommodation.

Functional unit

The functional unit selected for the basic accommodation in this note and the related cost note issued herewith as an addendum to Appendix E of Hospital Building Note No. 2—*The Cost of Hospital Buildings*—is the department as described under Section I—*Scope*.

B. Additional accommodation

Some accomodation in addition to the basic may be required—

(*a*) Rest room
(*b*) Clerks' office
(*c*) Bulk store
(*d*) Cleaners' room
(*e*) Autoclave area for clean-up room

IV. Description of rooms

A. Basic accommodation

(*a*) *Trolley unloading bay*

This is where all used and time-expired material will be delivered in order to be re-processed. Sufficient clear space must be allowed for manoeuvring and unloading trolleys. The unloading bay should connect with the clean-up room and it may be an advantage to unload directly onto a counter with a pass-through hatch. About 150-200 sq. ft. should be allowed.

(*b*) *Clean-up, washing and drying room*

It is the usual practice to wash and dry all "hard" goods such as syringes, instruments, bowls, etc., in the clean-up room. Rubber gloves and tubing, etc., may also be washed and dried here. Large double-compartment sinks will be required for rinsing, and probably ultrasonic or high pressure jet washing machines for cleaning. Hot air drying cabinets will be required. A non-absorbent work top should be provided. About 250-350 sq. ft. will be needed.

(*c*) *Glove room*

The usual practice is for rubber gloves to be washed and dried in the clean-up room before being sent to the glove room for inspection, powdering, sorting and packing. However, it is sometimes preferred to wash and dry the gloves in the glove room and space will then be required for automatic washing and drying machines as well as the powdering machine and a work top for inspecting and packing. About 60-80 sq. ft. will be needed. This room will not be required if the hospital uses disposable gloves delivered in sterile packs.

(*d*) *Syringe and instrument room*

Syringes and instruments, unless in composite packs, are generally sterilised by a dry heat method.

Dry heat sterilising is carried out either in hot-air ovens electrically heated and equipped with a fan for forced-air circulation or in a radiant heat oven or moving belt steriliser employing infra-red elements. If the latter is provided, it should preferably be arranged to deliver the sterile articles directly into the sterile store.

Having arrived from the clean-up room the syringe plungers are lubricated, the syringes assembled and the needles inspected, and sharpened if necessary. A work top is required for the microscopes, sharpening apparatus and other equipment. Capping machines will be required for the aluminium containers. Storage space in racks or drawers is required for spare barrels, plungers, needles, etc. About 250-300 sq. ft. will be needed. This area could be reduced if disposable needles were used and reduced again if disposable syringes were introduced.

(*e*) *Bulk store*

This is for the storage of materials to be sterilised, cotton wool balls, gauze swabs, disposable towels and gallipots, etc., which are usually received direct from manufacturers. Full-height open adjustable shelving is required. The bulk store should open directly into the work room. It should be at least 400 sq. ft. in area.

(*f*) *Linen store*

Towels, masks, gowns, etc., received clean from the laundry are stored here. The linen store should connect directly with the work room and have ample open adjustable shelving. About 300 sq. ft. is required. This room might be combined with the bulk store.

(*g*) *Supervisor's office*

This will be the administrative centre of the department and it should be sited for good supervision, particularly of packing operations in the work room. Space is required for a desk or table, chairs, bookcase and filing cabinets. About 100 sq. ft. is sufficient.

(*h*) *Work, packing and autoclave room*

The packs to be sterilised are made up here from components drawn from the bulk store, linen store, glove room and clean-up room. There should be a work-flow from stores at one end to autoclaves at the other. A work top or tops, on which the packs are assembled, is needed together with storage for components of packs. Space is required for working around a linen folding table. It is helpful if the table has a black top, or a translucent top, lit from below, so that any holes can easily be seen. All surfaces should be easy to clean. About 700 sq. ft. is needed. Storage shelving for packed goods awaiting sterilisation is required.

The autoclaves should be sited at one end of the work room. They must be well insulated and designed to minimise the emission of unnecessary heat to the remainder of the building (see Section V). Autoclave enclosures should be large enough to provide adequate access for maintenance and be suitably ventilated to the exterior of the building to prevent the build-up of heat. Access to the enclosure should be from outside the work room.

(*i*) *Sterile store*

This store is at the end of the "production line" and sterile packs will be stored here pending delivery. The store should be planned for easy delivery of the sterile articles from the autoclaves and dry heat sterilisers. Generally the sterile packs should be kept on shelves rather than in cupboards, for easy quick visual checking of numbers and to save time when issuing. All surfaces must be easy to clean. The sterile store should connect directly with the trolley loading bay. The size of the sterile store will depend on the number of days' supply of sterile goods that the hospital finds it necessary to keep in hand. This would probably be from four to six days and about 500-600 sq. ft. will be required. The relative amount of storage in the work room (*h*) and sterile store (*i*) will depend upon the operational policy of the department. Packs may be stored in a sterile condition, and so available for immediate issue, or goods may be stored ready packed in the workroom but unsterilised. If the latter system is used the storage in the work room should be increased and the amount in the sterile store correspondingly reduced.

(*j*) *Trolley loading bay*

Trolleys will be loaded here with sterile packs for despatch to the departments. Space will be required for manoeuvring and loading trolleys. About 150-200 sq. ft. will be needed.

(*k*) *Staff lockers and lavatories*

Staff lockers, w.c. and washing facilities should be provided exclusive to the C.S.S.D. A shower is an advantage. Not less than 100 sq. ft. is required.

(*l*) *Circulation space*

B. Additional accommodation

(*a*) *Rest room*

Where no alternative facilities exist a rest room may be required. About 10 sq. ft. per person will be necessary with a minimum area of 100 sq. ft.

(*b*) *Clerks' office*

A small office for clerks may be required. An area of 60 sq. ft. per clerk is recommended with a minimum area of 100 sq. ft.

(*c*) *Bulk store*

Some bulk storage may be required additional to the area provided in A(*e*), depending on the output of the department and whether supplies are delivered direct to the department or via the central (group) stores.

(*d*) *Cleaners' room*

A cleaners' room may be required unless there is one in the vicinity of the department. Space is needed for a bucket sink, drainer, locker and space for mechanical cleaning equipment, brooms, buckets, etc. An area of 50 sq. ft. should suffice.

(*e*) *Autoclave area for clean-up room*

If an autoclave is provided in the clean-up room (III) and (IV)A(*b*) for the disinfection of returned fouled articles, an additional 100 sq. ft. will be required.

V. Engineering Services

Engineering services should be designed and installed in such a way as to ensure the minimum interruption of services and disturbance to the working of the department while repairs and maintenance are being carried out.

The installation of meters for departmental costing purposes should be considered where this can be done conveniently and inexpensively.

Mechanical services

Heating and ventilation

Space heating requirements should be calculated on the following room temperatures based on an outside temperature of 30°F.:

Accommodation	*Temp. F°*	*Air change per hour*
Clean-up, glove, syringe and work rooms, supervisor and staff rest room	65	2
Staff lockers and lavatories ..	60	2
Bulk, linen and sterile stores ..	55	1
Loading and unloading bays ..	55	2

The design should allow the temperature of the department as a whole when unoccupied to be reduced to 45-50°F. to reduce fuel costs.

The heat emitted from the various sterilisers should be taken into account when designing the heating system.

Natural ventilation will normally be satisfactory, but small fans may be needed to remove excess heat at points where for example the steam pressure and infra-red sterilisers are installed. Extract ventilation may also be required in the glove room unless an enclosed powdering machine is used.

Hot and cold water and drinking water services

These are normally provided from the main services of the hospital to serve lavatory basins and sinks. Normal pillar taps should be provided except possibly for basins in staff toilets where spray taps tend to be more economical in use.

A shower, if provided, should be thermostatically controlled. The fitting should be provided with a hand spray.

A drinking water supply point from the mains should be provided in or adjacent to the changing or rest room. An automatic carton dispenser has advantages.

Water at a temperature of 180°F. is necessary for rinsing syringes, etc., and for this purpose means for increasing the normal hot water temperature must be provided.

Steam services

Steam supplies will normally come from the main steam service. There are advantages in planning the department near the main boilerhouse. An independent steam boiler will be required in the absence of a main steam service.

The autoclaves normally have a working pressure of 32 p.s.i. and to ensure that this pressure is maintained the steam supply main entering the department should be at a pressure of not less than 50 p.s.i. and the steam mains must be of adequate size for working and initial heating-up requirements.

The steam supply should be as dry as practicable* and therefore the main should be properly insulated and adequately drained through steam traps and a steam separator should be fitted close to the point of entry into the chamber of the steriliser.

Compressed air service

This is required in the syringe room for forcing air through the needles before sterilising and for working certain apparatus and can be provided from a small compressor or from air bottles.

Fire alarms and fire-fighting equipment

Advice on fire alarms and extinguishers is given in the B.S. Codes of Practice and in the Ministry's circular: Hospital Fire Precautions.

Electrical installation

The electrical installation will include wiring and equipment for lighting, socket-outlets, processing equipment, heating and ventilating equipment, telephones, fire alarms and clocks.

The wiring should consist of V.R.I. or P.V.C. insulated cables enclosed in screw-jointed conduit or mineral insulated copper clad cables. The latter form of wiring should be used where high ambient temperatures are likely.

Supply and distribution

A 3-phase supply should be provided when this exists in the hospital. Unless a conveniently located distribution centre is available for use in an adjacent department, a switch cupboard should be provided in the department for the sub-main and local switch and distribution equipment. The size of the switch cupboard should allow a working space and space for possible future extensions.

Distribution boards should be installed in dry and readily accessible locations. H.R.C. fuses are recommended and spare fuse ways and fuses should be provided.

Processing equipment

Electrical components on sterilisers and other fixed equipment should be connected to the supply by means of permanently installed wiring.

Socket outlets

Thirteen amp. universal switched shuttered outlets on ring circuits should be provided to allow each portable appliance which is likely to be used at the same time to be connected to a separate outlet. Sockets for domestic cleaning purposes should be arranged to suit apparatus with leads assumed to be 30 ft. long.

Socket outlets for use with non-luminous heating appliances should incorporate a neon-type indicating lamp.

General lighting

General lighting should follow normal hospital practice, and special lighting applicable to this department should have the following recommended average illumination levels at 3 ft. above the floor:

Accommodation	*Average Lumens/sq. ft.*
Clean-up, glove, syringe and work rooms ..	30
Supervisor	15
Bulk, linen and sterile stores, staff rest room, staff lockers	7
Lavatories, loading and unloading bays ..	7

The syringe and instrument bench will require additional lighting fittings.

Outside lighting should be provided as necessary.

Local switch control for room lighting will be satisfactory, but controls for lighting fittings in corridors and illuminated signs should be conveniently grouped.

Emergency electricity supplies

These would be necessary only in areas subject to frequent power cuts.

Telephones

Extensions from the hospital exchange, both for

*The report of the Medical Research Council's Working Party on Pressure Steam Sterilisers, published in *The Lancet* of 28th February, 1959, recommended a dryness fraction of 0.95.

external and internal calls should be provided to the supervisor's office, and to a central position in the workroom. A message board near the latter may be useful.

Staff location system

A wired staff location system or radio induction system is not considered necessary.

Electric clocks

Where an impulse clock system exists, it should be extended to the C.S.S.D. to serve the supervisor's, syringe, work, glove and rest rooms, using silent clocks.

Process machinery

At present it is not possible to give definite advice on the most suitable type of process equipment for each specific job, as much of the equipment is in an experimental stage and investigations are being continued. The capacity of the equipment must be related to the calculated load and time available with due allowance for standby equipment if thought desirable. *However, the following table shows process equipment that is likely to be required in a central sterilising department as described in this Note:

Process	*Machinery*	*Approximate (electrical) connected load*
The sequence of the process is generally as follows:		
SYRINGES AND NEEDLES		
Dismantle	(By hand)	—
Wash and rinse	Ultra-sonic cleaner and rinser	2 kw.
	or	
	Jet washing and rinsing machine	3 kw.
Dry	Drying cabinet (hot air oven)	1 kw.
Test (needles)	Compressed air (compressor or bottles)	1 kw.
Sharpen (needles)	Needle sharpening machine	fractional h.p.
Examine	Microscope with light attachment	—
Pack and seal	Bottle moistener	—
	Capping machine	—
Sterilise	Infra-red heated conveyor(1)	8 kw. (divided between phases)
GLOVES		
Wash	Glove washing machine	fractional h.p.
Dry	,, drying machine	,, ,,
Powder	,, powdering machine	,, ,,
Examine	(By hand)	—
Sterilise	High pressure pre-vacuum steriliser(2)	15 amps. per phase (3 phase and neutral)
PACKS		
Sterilise	High pressure pre-vacuum steriliser (2) (3)	15 amps. per phase (3 phase and neutral)

Notes: (1) It is necessary to fit an auto-transformer or an automatic voltage regulator to the infra-red steriliser.

(2) The high pressure pre-vacuum sterilisers can be used for either gloves or packs. Normally the size of the steriliser need not exceed 20 cu. ft. sterilising capacity.

(3) Where instruments form part of the pack they can be sterilised in the high pressure pre-vacuum steriliser. Where instruments are packed in containers, similarly to syringes, they can be sterilised in the infra-red heated conveyor.

*The technical officers of the Ministry of Health are available to advise hospital authorities in England and Wales contemplating the purchase of sterilising equipment.

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Central Sterile Supply Department

Hospital Building Note No. 13

The scales of accommodation and cost recommendations are for provisional application to a department serving 800 beds or more with related diagnostic and treatment services for out-patients. They apply to general and to teaching hospitals.

As central sterile supply departments are still in an early stage of development in this country there may well be acceptable proposals which differ considerably from what is proposed in Hospital Building Note No. 13. The cost of such proposals may have to be individually assessed.

Basic accommodation

(*a*) *Trolley unloading bay*

(*b*) *Clean-up, washing and drying room*

(*c*) *Glove room*

(*d*) *Syringe and instrument room*

(*e*) *Bulk store*

(*f*) *Linen store*

(*g*) *Supervisor's office*

(*h*) *Work, packing and autoclave room*

(*i*) *Sterile store*

(*j*) *Trolley loading bay*

(*k*) *Staff lockers and lavatories*

(*l*) *Circulation space—necessary for the above accommodation*

Additional accommodation

(*a*) *Rest room*

(*b*) *Clerks' office*

(*c*) *Bulk store*

(*d*) *Cleaners' room*

(*e*) *Autoclave area for clean-up room*

Circulation space—for the purpose of the provisional cost limit the area occupied by internal circulation space and internal partitions represents, on average, an addition of 12½ per cent to the net floor area of the basic and additional accommodation.

DEPARTMENTAL COST ALLOWANCES

1. Basic accommodation

Functional unit—the department

For the department—allow £36,350

2. Additional accommodation

Cost of additional accommodation—
allow £5 4s. 0d. per square foot.

Note: Engineering

The following engineering services are included in items (1) and (2) above and account for approximately 58-60 per cent of the total cost of basic and 20-22 per cent of the total cost of additional accommodation:

Space heating and ventilation; steam and condense; gas

Hot, cold and drinking water

Lighting, power, clocks, telephones and fire alarm system

Equipment and process machinery described in Section V of Building Note No. 13.

Item 2 does not include an allowance for pressure-steam steriliser in the additional clean-up area (Additional accommodation (*e*) above).

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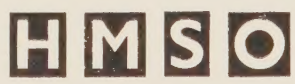

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